Assessment of Outcome Scores of the Hip

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Filippo Randelli, Gaia Santambrogio, Gennaro Fiorentino, Manuel Giovanni Mazzoleni, Alberto Fioruzzi, and Vittorio Calvisi

A comprehensive and comparable assessment of the outcomes following hip surgery, or any other treatment, is still a difficult task for orthopedic surgeons and all other physicians and physiotherapists involved. In the last 30 years, orthopedic surgeons, trying to overcome this barrier, have invited the patients to be much more interactive in their healing process. Standardized measurements of assessing the outcomes directly from the patients have been developed. They are called patient-reported outcome measurement (PROM). They are comprehensive and include symptoms (pain the most), physical functionality, mental health, social life, and general well-being of the patient.

The growth of these patient-reported outcome measurement (PROM) lies from the need of filling the gap in the clinical routine between the pure physician's point of view and the most important and real one, the one of the patient [1, 2].

Through PROMs, physicians may detect physical or psychological problems that otherwise might be missed, monitor the disease and its treatment, and recommend changes in therapeutic plans. They facilitate the communication between physician and patient and, of course, improve the quality and delivery of care [3].

Physicians are now starting to choose personalized treatments based on these new tools.

A question could arise: Why considering the point of view of the patient? There can be many answers, but above all, we have learned that only a patient himself/herself can assert if a symptom reduces, a disability improves, or the quality of life ameliorates. Furthermore, involving patients in their therapeutic plan can bring a benefit in their healing process focusing on the specific questions and details that really matter. With a standardized measurement, it is also much likely to avoid confounding bias by the observer [4]. Last but not least, PROMs transform the obtained results into numbers, which can therefore be easily compared.

For designating the perfect PROM for each patient and his/her clinical case, it is possible to consult databases that aim at offering the most exhaustive and updated collection of principal tools for patient-reported outcome measurement and indeed choose easily the most appropriate. For example, there is the French *MAPI Research Institute* that, in 2002, has started building a comprehensive database, nowadays named *Patient-Reported Outcome and Quality of Life Instruments Database* (PROQOLID) [5].

F. Randelli (✉) · G. Santambrogio · A. Fioruzzi
Hip Department (CAD) Gaetano Pini—CTO Orthopedic Institute University of Milan, Milan, Italy
e-mail: filippo.randelli71@gmail.com

G. Fiorentino
Ortopedia e Traumatologia, Humanitas Gavazzeni, Bergamo, Italy

M. G. Mazzoleni · V. Calvisi
Università degli Studi dell'Aquila, L'Aquila, Italy

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In the United States, there exists a national register independent from each hospital, which reunites all the different questionnaires and information from every state in the country. These questionnaires are part of the registration process within the personal information provided by entering the hospital. Firstly, they use the *Short Form-36* (*SF-36*) or its short version *SF-12* and then the *Hip disability and Osteoarthritis Outcome Score* (*HOOS*), and they, then, administer every step of the therapeutic process; in the western states of the country, the *UCLA activity score* is also used. In addition to these PROMs, other data are collected, such as information about adverse events or the prosthesis of each patient within their X-rays. This choice has been made for evaluating first a general PROM, such as the SF, for collecting information about the general health of the patient, and the second time a more specific PROM about the hip problem [6].

There are different types of questionnaires we can use today specifically for a hip problem.

Oxford Hip Score (OHS): The original version is from 1996 [7], and it was updated in 2007 [8] introducing a new scoring system. The aim of this score is mainly to evaluate the outcome of a total arthroplasty measuring the perception of the patient besides one of the physicians. The questionnaire is developed in 12 items, 6 grading the pain and 6 grading the functionality of the hip related to everyday activities, like walking, getting dressed, and sleeping. There are five possible answers for each question, and the original score divided them from 1 to 5 (from the best to the worst scenario) with a total possible score of 60, the worst scenario, and a minimum of 12, the best scenario. Today, the new scoring system, also supported by the original authors, is from 0 to 4 (the worst to the best) with a total score of 48, which is the best scenario and the minimum 0, the worst scenario. This score has also been validated for total hip joint revision operations [9]. Some cutoffs have been set to quickly explain the meaning of the results in terms of success of the procedure: >41 excellent, 34–41 good, 27–33 fair, and <27 bad. In an article published in 2005 by Kalairajah et al. [10], the OHS has been validated as a predictor for early revision intervention after a total hip joint replacement within 6 months. A fair or bad score has been associated with a risk of revision within the next 2 years of 7.6%, while a good or excellent score has a risk of just 0.7% [11]. This is one of the most used PROMs in the world, and this is why we can find different validated translations such as in Dutch [12], Japanese [13], German [14], and French [15], and we have its version also for total knee joint replacement [8] and shoulder surgery [16]. This is a useful measurement outcome score, prevalent and effective in total hip replacement. The reader can find the scoring system within the original work of Dawson et al. [7]. It is a straightforward questionnaire that takes just a few minutes to be completed. It is especially useful if repeated at different stages of the recovery.

There is, of course, some bias due to some confusion around a couple of questions, lack of information about hip flexion, and need for analgesics.

Hip Outcome Score (HOS): This score is dedicated to patients with hip disability more or less related to degenerative arthritis. There are two validated versions, slightly different from each other: LK1.1 and LK2.0 [17, 18]. The LK2.0 version includes the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) LK3.0 [19] in its complete and original format, and from this, the WOMAC score can be obtained. In 2008, a short version with only five items was validated measuring the physical function, the HOOS-PS. The HOOS questionnaire consists of five sections: pain, other symptoms, functionality in daily life, functionality in sports and recreational activity, and quality of life related to the hip. It has 40 items in total divided into 10 items for pain, 5 items for other symptoms (3 movements, 2 stiffness), 17 for functionality in daily life, 4 for functionality in sports, and 4 for functionality in quality of life. There are five possible answers for each question with a score from 0 to 4. Scores are then added for each section and translated into a 0 to 100 score, in which 0 indicates the worst possible scenario and 100 the best one. This questionnaire is very commonly used around the world, and it has been translated and validated in Swedish [18], Dutch

[20], and French [21]. There are also some translated versions, but not validated, in Danish, English, German, Korean, and Lithuanian. The full items' questionnaire can be examined, by the reader, from the work of Nilsdotter et al. [18]. The strength of this score is an extension of the WOMAC score, which is also more suggested for young and active adults, so it is more effective and complete. It is proved to be very useful in the follow-up of patients affected by hip degenerative arthritis.

Harris Hip Score (HHS): It was developed for evaluating hip surgery outcomes. It was thought not only for total hip joint replacement but also for femur neck fracture and hip degenerative arthritis. The earliest version, available for consultation from the 1969 original William H. Harris' work [22], is still one of the most used questionnaires all over the world. It includes pain, functionality, absence of deformity, and range of motion. In this questionnaire, we only have ten items, with a maximum score of 100, which represents the best scenario. The items are pain, 1 item (maximum 44 points); functionality, 7 items (maximum 47 points); absence of deformity, 1 item (maximum 4 points); and mobility, 2 items (maximum 5 points). The total score is based on the addition of the four sections, and the higher the results, the better the condition; a score <70 is considered poor, between 70 and 80 fair, 80–90 good, and 90–100 excellent. Despite its popularity around the world, the validated translations are just a few: Portuguese [23], Italian [24], and Turkish [25]. The HHS is today one of the most used questionnaires around the hip (from total hip joint replacement to conservative therapies). Furthermore, HHS is the most used questionnaire also for femoroacetabular impingement (FAI). There is a shortened version of the HHS, the **modified Harris Hip Score (mHHS)**, designed within the original paper of Byrd et al. in 2000 [26]. The mHHS is an eight-item questionnaire that focuses mostly on the pain and functionality. The total score is from 0 to 100, from the worst scenario to the best possible. Although patients with FAI were not included in the creation of this short version of HHS, mHHS is the most used before and after hip arthroscopy.

The Copenhagen Hip and Groin Outcome Score (HAGOS): This is a score for young and middle-aged adults, physically active and with hip or groin pain [27]. It has been developed from the need to have a new tool considering the whole variety of different treatments for hip pain. It covers the anatomy structure and function of the hip joint, limitations related to activity, and limitations of social life. It evaluates 37 items, divided into six sections: pain (10 items), symptoms (7 items), daily activity (5 items), sports and recreational activity (8 items), participation in physical activity (2 items), and quality of life (5 items). The score goes from 0 to 100, where 100 means no problems at all and 0 means severe pain and disability. HAGOS has been the first PROM for young and active patients with impacting hip or groin pain. The reader can find the full questionnaire within the original Thorborg et al.'s work [27], which has been validated in several languages, such as Swedish [28], Dutch [29], and Chinese [30]. This questionnaire has also been considered very useful for young athlete patients, as football players [31].

International Hip Outcome Tool (iHOT-33 and iHOT-12): In 2012, this new questionnaire was developed evaluating the quality of life in young and active patients with hip pain [32]. The reader may find the full original questionnaire as appendix of the original work of Mohtadi et al. [32]. The aim was to create a specific tool for this selected and demanding subset of population. Indeed, in the inclusion criteria, we can find patients between 18 and 60 years with an activity level >4 in the Tegner activity scale [33]. The iHOT-33 is composed of 4 sections with a total of 33 items: symptoms (16 items), sports and recreational activities (6 items), job-related concern (4 items), and social, emotional, and lifestyle concerns (7 items). The maximum score possible is 100, which represents the best scenario, while 0 represents the worst scenario. In 2012, the same working group developed a shortened 12-item version, iHOT-12, available for consultation in the appendix of their original article [34]. The iHOT-12 has been demonstrated to be comparable to the iHOT-33 but much quicker. We already

have different validated translations of the two scores: German [35], Chinese [36], Portuguese [37], and Spanish [38].

Victorian Institute of Sport Assessment-G (VISA-G): This is a score developed and validated in 2015 [39], aimed to evaluate the severity of disability of patients affected by a greater trochanteric pain syndrome (GTPS). Since then, no specific PROMs have been developed for this common condition, forcing the clinicians to use surrogate measuring tools designed for hip osteoarthritis or low back pain. Different VISA questionnaires, such as VISA-A [40], VISA-P [41], and VISA-H [42], have been widely adopted to assess, quantify, and monitor, respectively, patellar, Achilles, and hamstring tendinopathies. As the GTPS often involves a tendinopathy of the gluteus medius and minimus tendons, the VISA questionnaire structure may be a valid measurement to adopt for the lateral hip pain [39]. The VISA-G questionnaire, entirely reported as appendix of Fearon et al.'s original work [39], consists of 8 simple and quick queries, with a maximum score of 100 points. The first question concerns the pain related to the hip evaluated by a numeric scale rating. The following questions, from 2 to 7, concern pain and disability, caused by the hip, during the daily activity. The eighth and last question is instead divided into three sections, A, B, or C, of which the patient must answer only one of them, according to his/her ability to undertake weight-bearing activities related to the severity of hip pain. Since it has been developed for a few years, the VISA-G questionnaire is not yet widespread and has undergone only a validated translation in Danish [43].

Non-Arthritic Hip Score (NAHS): As the interest in hip pathologies of the young patients has grown, it has become more urgent for clinicians to develop clinical scores suitable for non-arthritic joint diseases. With this goal, in 2003 [44], a new system was designed to assess preoperative and postoperative hip pain and function in a younger and more athletic population. In order to maximize the patient compliance, this self-administered scoring system is symptom related only, avoiding also bias due to clinician interpretation or physical examination influences. This score has been created as a modified Western Ontario and McMaster Universities Osteoarthritis Index, including 20 concise unweighted multiple-choice questions, divided into four sections, concerning, in order, pain, mechanical symptoms, physical function, and level of activity. Each answer corresponds to a numeric value, of which the total sum must be multiplied by 1.25 to achieve the final score. The normal hip function is represented by the maximum score of 100 points. The NAHS is ultimately designed to assess and stratify the activity level in 20- to 40-year-old athletic patients who are limited in some way by their hip disease without a clear radiographic diagnosis. The reader may find the entire questionnaire in the appendix at the end of the original work of Christensen et al. [44]. This score has been translated and validated only in Brazilian Portuguese in 2013 [45].

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